

Cornell iGEM presents

fishPHARM

Feasibility Analysis

Product/Service Feasibility

The aquaculture industry, or the industry involved in growing fish and other marine life in controlled settings for the purpose of food production, is a growing and lucrative industry, worth over \$60 billion. The aquaculture of salmonoid fish represents \$11 billion of the industry. This sector, while profitable, also faces the problem of bacterial cold water disease – caused by flavobacterium – which can cost tens and even hundreds of thousands to treat on each fish farm every year. Currently, outbreaks are treated with antibiotics and hydrogen peroxide water treatments. Hydrogen peroxide treatments are limited in their effectiveness against systemic disease, and antibiotics breed resistant forms of the flavobacterium, which bring a myriad of other problems. The proposed venture, fishPHARM, will address the needs of the aquaculture industry for a non-antibiotic treatment for this disease, by manufacturing a biologically engineered peptide which has 100% effectiveness in inhibiting flavobacterium. In addition to this, fishPHARM will suspend this peptide within a time-released hydrogel for extended treatment. To deliver this gel, fishPHARM will manufacture a novel drug delivery system based on existing fish-tagging technology. Finally, to address the lack of efficient water quality monitoring methods within the fish farming industry (which are key for prevention of the disease), fishPHARM will develop a monitoring system as well as an app which will allow farmers to follow the conditions of their hatcheries in real time. All of these problems have been verified by members of the aquaculture industry, and they have expressed their excitement for such products and services.

Introducing these products and services into the market would be a good idea at this point, since little to no progress has been made towards a cure in a very long time. They would fill a very large gap in the marketplace by solving the problem of BCWD, and would take advantage of the negative popular opinion on antibiotics.

Industry/Target Market Feasibility

Fish farming, a form of aquaculture, has become one of the fastest growing industries in the past several decades. Before the 1970s, it did not exist in any meaningful form. Today, it represents a \$60 billion industry that ships almost 34 million tons of fish around the world. An important sector, aquaculture of salmonid fish, represents an \$11 billion chunk of this market.

However, Bacterial Coldwater Disease (BCWD), found only in North America until the 1980s, has now spread around the world and represents a major threat to this market. Despite the potential economic impact, little progress has been made in the fields of prevention and treatment. One vaccine candidate is under development from the University of Idaho and is currently undergoing field trials. However, its costs, duration of immunity, and need for revaccination are currently unknown. In addition, delivery of the vaccine by immersion has been shown to have questionable efficacy at best. The only existing prevention method is careful maintenance of water conditions by fish farmers, and human behavior is hardly reliable.

In terms of treatment, antibiotics are currently used to control outbreaks, but strains of the disease's causative agent have been shown to easily develop resistance. Antibiotics are also ineffective if the disease is well established in an area, as one symptom is lowered appetite in fish, precluding actual consumption of the treatment.

Given the lack of innovation, this market should be highly receptive to new solutions, like our fish tag peptide treatment system. It uses a technology farmers are already familiar with, fish tags, to treat BCWD without any of the consequences of current treatments. Until an easily accessible and cost effective vaccine is developed, the fish tag system, combined with proper preventative action by farmers, should provide a strong two-sided approach to reigning in the economic impact of this disease. In fact, it will be the only approach for the foreseeable future in a multi-billion dollar market, making it an investment with a very high potential reward.

Organizational Feasibility

Speaking to the qualifications of the management of the proposed venture, it does not possess a significant amount of entrepreneurship experience or experience in the aquaculture industry. However, all of its members attend Cornell University, a top-20 research institution.

They all manage well in their academics as well as balancing a plethora of other extracurricular activities. Therefore, they possess the intelligence and work-ethic to successfully manage this venture.

Although the management's understanding the aquaculture industry is not at an ideal level, the extensiveness of the professional networks available to them because of their affiliation with Cornell University and their location in the heart of aquaculture in the northeast United States is innumerable beneficial. In addition, their passion for ensuring the food supply for a growing population and helping hardworking fish farmers who struggle economically with BCWD will go far for their success in this venture.

The management also possesses many non-financial resources which increase their chances of survival in their early stages. These resources are as follows: 1) 3D printers for manufacturing drug delivery system, 2) workspaces for meetings and small-scale manufacturing of fish tags, 3) biological engineering facilities for the manufacture of the peptide treatment, 4) team member knowledge of product R&D processes, 5) availability of the Cornell Center for Technology Licensing for the protection of intellectual property, 6) connections to Cornell faculty knowledgeable in entrepreneurship, aquaculture, and all fields of engineering, 7) contacts with members of the aquaculture industry, 8) affiliation with a leading research institution, with near unlimited resources of its own, and 9) Cornell eLab, an entrepreneurship workshop and funding resource.

Financial Feasibility

An assessment of the total startup cash needed is displayed in the following table:

Sources of Capital

Owners' Investment (name and percent ownership)

George	\$ 50
Yi Fan	50
Neema	50
Rishabh	50
Jonlin	50
Michelle	50
Total Investment	\$ 300

Bank Loans

SBA General Small Business Loan 7(a)	\$ 150,000
Some other type of loan	15,000
Total Bank Loans	\$ 165,000

Startup Expenses**Buildings/Real Estate**

Purchase (Rent)	\$ 24,000
Construction	-
Remodeling	
Other	500
Total Buildings/Real Estate	\$ 24,500

Capital Equipment List

Furniture	\$ 5,000
Equipment	7,000
Fixtures	-
Machinery	5,000
Other	3,000
Total Capital Equipment	\$ 20,000

Location and Admin Expenses

Rent & Related Costs	\$ -
Utility deposits	-
Legal and accounting fees	5,000
Prepaid insurance	-
Pre-opening salaries	-
Other	-
Total Location and Admin Expenses	\$ 5,000

Opening Inventory

Fish Tags	\$ 5,000
Applicator	5,000
Gel	4,140
Entericidin	500
Packaging	1,000
Total Inventory	\$ 15,640

Advertising and Promotional Expenses

Advertising	\$ 1,000
Signage	1,000
Printing	1,000
Travel/entertainment	1,000
Other/additional categories	-
Total Advertising/Promotional Expenses	\$ 4,000

Other Expenses

Patent	\$ 10,000
Total Other Expenses	\$ 10,000

Reserve for Contingencies \$ 30,000

Working Capital \$ -

Summary Statement**Sources of Capital**

Owners' and other investments	\$ 300
Bank loans	165,000
Other loans	-
Total Source of Funds	\$ 165,300

Startup Expenses

Buildings/real estate	\$ 24,500
Leasehold improvements	-
Capital equipment	20,000
Location/administration expenses	5,000
Opening inventory	15,640
Advertising/promotional expenses	4,000
Other expenses	10,000
Contingency fund	30,000
Working capital	-

Total Startup Expenses\$ 109,140

There are currently no similar business that develop a treatment specific to BCWD. Therefore, an analysis on the financial performance of similar business cannot be conducted. However, estimates of the costs of a single antibiotic treatment for BCWD can reach to \$100,000. Couple this with the fact that up to 80% of fish farms in the US are affected by recurrent bouts of BCWD, and we calculate that the companies which manufacture fish antibiotics create a large amount of revenue. A treatment option that is more effective, cheaper, less prone to creating bacterial resistance (a problem which requires more expensive treatments), and capable of ensuring that fish will be antibiotic-free (a potentially-profitable, value-adding marketing ploy towards consumers of fish) will undoubtedly be a profitable venture.

Overall Assessment

fishPHARM is not only a good concept, but its services and products are in demand, the industry is a favorable one to enter, its management is capable of driving the venture forward, and it is a financially feasible enterprise.